(2) Gauging stations; methods adopted for measuring the discharge of streams.
(3) Pluviometry, nivometry, and glacial studies.
(4) Planimetry; surface measurement of basins.
(5) Levelling; determination of slope and fall.
(6) Publication of results.

The records are very full and complete. They abound in instances of local difficulties and the manner in which these were overcome. The work was carried out under the joint direction of M. de la Brosse and M. Tavernier. The former gentleman concerned himself more particularly with the basins of the Arve and the Isère, and the latter with the basins of the Durance and the Var.

There are a large number of appendices dealing with various matters of special interest, including some practical directions in the matter of gauge measurement, a note on the theory of screw calibration, a provisional estimate of the value of the hydraulic forces, a typical hydrological study of a mountain basin, and other cognate matters of importance.

The theoretical and mathematical investigations are of an extended and detailed character, and the volume forms a thoroughly complete and valuable guide for those who are engaged in hydrographical studies and experiments. A number of interesting photographs are reproduced, showing the actual operation of gauging as carried out at several places, and illustrating in a most effective manner the expedients described in the text for dealing with particularly difficult and almost inaccessible stations.

It is recorded that a good deal of very useful assistance was derived from voluntary workers, including those at power stations and industrial depôts. Help was also forthcoming from officers at military posts and from the staff of the conservators of waters and forests. Aid was rendered, too, by meteorological and geological departments, municipal and vicinal administrations, and by railway companies, notably the Paris-Lyon-Mediterranée. The coordination and instruction of all these various agencies, spread over an extended area, involved much care and attention.

The second volume is devoted almost entirely to a numerical record of the results of the work. It abounds in figures and data systematically collated and arranged, so as to be of immense value for reference purposes. It also includes a series of excellent maps of the various basins printed in colours, showing the subsidiary watersheds, and indicating the positions of the stations of observation. Altogether, the volumes are replete with information, and form a striking testimonial to the value and national utility of the Service d'Études des grandes Forces hydrauliques.

SUBTERRANEAN STUDIES.

L Évolution souterraine. By E. A. Martel. Pp. 388; with 80 figures. (Paris: Ernest Flammarion, 1908.) Price 3.50 francs.

IN France, the fascinating study of caverns—or, as it is now the fashion to call it, spelæology—has risen greatly in popular favour during the last twenty years, mainly through the energy and enthusiasm of M. Martel, one of the editors of *La Nature.* The scope of spelæology, in the course of its recent development, has become gradually enlarged until it now touches at one point or another almost the entire circle of the sciences. The work before us, which forms a volume of Dr. Gustave Le Bon's "Bibliothèque de Philosophie scientifique," extends, however, beyond the mere study of caves, though this forms its main theme. From caverns the author passes to the general phenomena of the underground world, and seeks to show how their study has a bearing on nearly all branches of knowledge, especially on the doctrine of evolution. The range of the work consequently comes to be extremely wide. Where the programme set before the writer is so ambitious, no reasonable reader can expect to find it worked out with thoroughness. Brevity often becomes imperative. The wonder is not that many of the subjects are touched with only a light hand; the wonder is rather that it has been found possible to crowd so much into a volume of such limited size.

Scattered through M. Martel's pages are many suggestions which seem to call for remark. Thus, with regard to the planes of rupture in the earth's crust, he suggests that the term "joint" should be limited to planes of stratification, whilst those fissures which run vertically or obliquely, and in stratified rocks across the bedding, should be called "diaclases" —one of the terms introduced by Daubrée in his system of nomenclature for divisional planes. No doubt it would be convenient to have some short word for a plane of bedding, but it will certainly require much persuasion to induce an English geologist to call it a joint, for this happens to be just the term that he is in the habit of applying to any plane other than that of stratification.

Our author does well to insist on the fact that the process of cave-making, so far from being due to a single agent, depends in most cases partly on mechanical erosion and partly on chemical corrosion. Which of the two processes is the more important is determined to a large extent by the character of the rock to be hollowed out. Moreover, the formation of these subterranean hollows has not been limited, as some Continental writers have supposed, to any particular geological epoch.

On the question of the supposed desiccation of the earth—a subject on which so much has been written—M. Martel holds very pronounced views. Whilst some writers who admit the progressive diminution of the earth's superficial waters believe that it proceeds too slowly to be recognised in historic time, our author holds that abundant evidence of the change may be cited within the range of human history. On the other hand, a compensating action may come into play if it be true, according to an opinion that has recently been gaining ground in certain quarters, that much of the water emitted as vapour by volcanoes is derived from the deep-seated magma of which it is an original constituent, so that its emission is a direct contribution to the surface-waters of the globe.

It was only to be expected that M. Martel would have much of interest to say on his favourite subject

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of the hygiene of potable waters. Those who are acquainted with his former writings will not be surprised at his warning that springs of apparently pure water are in many cases merely the outflow of surface-waters which have disappeared through fissures, carrying with them pollution from the soil and not undergoing purification during their passage through the rocks. Even chalk, according to the writer, is generally far from being a thoroughly effectual filter.

In glancing through M. Martel's work the reader will find, probably to his surprise, that the spelæologist is unquestionably a being of large discourse, looking before and after. In one part he discusses the origin of man and the cradle of his civilisation; in another he speculates on the probable future of humanity; in an early chapter he discourses on the hypotheses concerning the beginning of the earth; in the last chapter he carries the reader forward to the catastrophes likely to bring the history of our planet to a close. Notwithstanding the fact that the range of subjects is thus so wide and diverse, the book remains readable and informing throughout. M. Martel is always vivacious, sometimes impressive, and occasionally original—but never obscure. In fine, he has written a little book which may be described in the best sense of the word as popular.

CHEMISTRY OF PHARMACOLOGY.

The Chemical Basis of Pharmacology. By Francis Francis and J. M. Fortescue-Brickdale. Pp. xii+372. (London: E. Arnold, 1908.) Price 14*s.* net.

THE general scope of this work is indicated by the above title and the subtitle, reading "An Introduction to Pharmacodynamics based on the Study of the Carbon Compounds." Short general introductions to chemistry and physiology are first given, dealing with such subjects as valency, structural formulæ, isomerism, correlation of chemical and physiological properties, and the relationships between structure and action. Then follow chapters on the main groups of carbon compounds, for example, hydrocarbons, alcohols, purine bodies, and the alkaloids, their methods of preparation and properties, both chemical and physiological. The book contains a fund of information, from which many suggestions as to lines of research may be gathered, and is a genuine attempt to systematise our present knowledge of the chemistry of pharmacology. As such it should prove of great use, more particularly to physiological and pharmaceutical chemists rather than "to the practitioner who is daily brought in contact with the claims of new drugs," and whose chemical knowledge could hardly be expected to reach the standard required for the assimilation of the information given, however desirable such a state of things might be.

We agree with the authors that the student of organic chemistry will find in the work an introduction to a fascinating branch of applied chemistry, but think that the usefulness of the book, alike to the student of chemistry and manufacturer of synthetic drugs, would have been largely increased had more references to original papers been given. It is also to be regretted that more care has not been bestowed on the book during its passage through the press. The orthography is sometimes unusual in such words as "etherial," "radical," "Kekule," and the work contains innumerable press errors, and many which cannot be attributed to this cause. For example, the expression (p. 90)

$$C_2H_5.OH + HNO_2 = H_2O + C_2H_5ONO2 \text{ (Ethyl nitrite)}$$

is not an equation, nor is the formula for ethyl nitrite correct. Butyl chloral (pp. 79, 109) has not the formula $CCl_3.CH_2.CHO$, and trichloroethyl alcohol is not accurately represented as $CCl_3.COH$. Such faults are inexcusable.

A very deplorable aspect of modern chemistry in its application to pharmacy or physiology would appear to be the lack of system in nomenclature, and a consequent flood of synonyms. This point does not seem to have appealed to the authors, for we find them either ignorant of, or not in agreement with, the systems of nomenclature adopted by the Physiological and Chemical Societies, and in consequence confusion is rendered worse confounded by the adoption of any and every style of naming. We quote as examples "proteid or protein"; "methyl or methylic alcohol"; "sodic or sodium acetate"; "silver hydrate, aqueous potash, ammonium hydroxide"; "glycerol or glycerin"; "mannite or mannitol"; "oxybenzoic or hydroxybenzoic acid"; and "1-oxy-2-iodo-4-chlorquinoline."

It could reasonably have been expected that the authors would have made a serious attempt to introduce order and method where chaos prevails by adhering strictly to those generally accepted principles of nomenclature which, though imperfect, materially help to build up an intelligible chemical literature.

A. C.

TWO RECENT BOOKS ON EVOLUTION.

(1) *A Picture Book of Evolution.* By Dennis Hird. Part ii. Pp. vi+214. (London: Watts and Co., 1907.) Price 2*s.* 6*d.* net.

(2) *Darwinism To-day.* By Prof. V. L. Kellogg. Pp. xiv+403. (London: George Bell and Sons; New York: Henry Holt and Co., 1907.) Price 7*s.* 6*d.* net.

WE cannot recommend anyone wishing to make himself acquainted with the present aspect of the problem of evolution to put himself under Mr. Hird's guidance. His treatment of the subject is crude and uncritical, nor does he give any evidence of familiarity with the evolutionary questions that are now chiefly engaging the attention of biologists. Putting minor inaccuracies aside, the book might have been of some service if published, say, forty years ago; at the present time it is to a large extent either misleading or superfluous. Opposition to the doctrine of species-formation by natural selection comes to-day, not, as the author seems to think (p. 25), from the "House of Lords or the pulpit," but from scientific men, both in this country and abroad; more particularly in Germany and America. While no educated person now disputes the fact of evolution, the Dar-

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